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AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A method of operating an electrochemical fuel cell stack comprising a plurality of fuel cells, each of the fuel cells comprising an anode, an ion transfer membrane, and a cathode, the method comprising:

delivering fluid fuel to one or more fluid flow channels in each anode of one or more fuel cells in the electrochemical fuel cell stack;

delivering fluid oxidant to one or more fluid flow channels in each cathode of the one or more fuel cells;

exhausting reaction by-products and unused oxidant from the one or more fluid flow channels in each cathode of the one or more fuel cells; and

delivering a sufficient quantity of liquid water to the one or more fluid flow channels in each cathode of the one or more fuel cells such that a relative humidity of 100% is maintained throughout the one or more fluid flow channels in each cathode of the one or more fuel cells;

wherein delivering the sufficient quantity of liquid water comprises:

determining, for each of a plurality of currents, a maximum voltage for the one or more fuel cells as a function of liquid water flow rate, the each of a plurality of currents being within a range of operating conditions of the one or more fuel cells;

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determining a calibration function expressing a minimum liquid water flow rate as a function of current and/or air stoichiometry, the calibration function being determined by variation of water flow rate to the cathode operating at constant current and constant air stoichiometry to determine minimum and maximum water flow rates repeated for a plurality of stack currents minimum liquid water flow rate being based on a corresponding maximum voltage; and

delivering at least the minimum liquid water flow rate for a corresponding current drawn from the one or more fuel cells and/or for the air stoichiometry, the delivered minimum liquid water flow rate being determined by the calibration function.

2. (Previously Presented) The method of claim 1, wherein the one or more fuel cells comprises less than all fuel cells in the electrochemical fuel cell stack.

3. (Previously Presented) The method of claim 1, wherein the one or more fuel cells comprises all fuel cells in the electrochemical fuel cell stack.

4. (Previously Presented) The method of claim 1, further comprising:

increasing a quantity of liquid water delivered to one or more fluid flow channels of each cathode of the one or more fuel cells as a function of fuel cell current in order to maintain a water factor greater than 1.0 for all currents within an operating range of the one or more fuel cells.

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5 and 6. (Canceled)

7. (Previously Presented) The method of claim 1, wherein the calibration function is determined for air stoichiometry in a range 1.1 to 10.

8. (Previously Presented) The method of claim 1, wherein the calibration function is determined for air stoichiometry in a range 1.4 to 4.0.

9. (Previously Presented) The method of claim 1, wherein delivering the sufficient quantity of liquid water comprises delivery of a water factor of at least 1.5.

10. (Previously Presented) The method of claim 1, wherein delivering the sufficient quantity of liquid water comprises delivery of a water factor of at least 3.

11. (Previously Presented) The method of claim 1, wherein delivering the sufficient quantity of liquid water comprises delivery of a water factor of less than 40.

12. (Previously Presented) The method of claim 1, wherein delivering the sufficient quantity of liquid water comprises delivery of a water factor in the range from 3 to 6.

13. (Previously Presented) The method of claim 1 further comprising:

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temporarily permitting delivery of a quantity of liquid water to one or more fluid flow channels of a cathode of the one or more fuel cells such that a relative humidity of less than 100% is maintained when an exhaust temperature of the cathode is below a predetermined threshold corresponding to a sub-optimal operating temperature.

14. (Previously Presented) The method of claim 13, which is applied upon start-up of the fuel cell.

15. (Previously Presented) The method of claim 1, wherein a fuel cell among the one or more fuel cells is operated such that, for any measured fuel cell power delivery, a liquid water injection rate into a cathode of the fuel cell and/or gas flow through the cathode are controlled to ensure that there is more liquid water in all regions of a surface of the cathode than can be evaporated in prevailing temperature and pressure conditions.

16. (Previously Presented) The method of claim 15, which is performed on a plurality of fuel cells in the electrochemical fuel cell stack having a common oxidant supply manifold and a common water injection manifold such that, for any measured stack power delivery, liquid water injection rate into the common water injection manifold and/or gas flow rate in the common oxidant supply manifold are controlled to ensure that there is more liquid water in all regions of cathode surfaces of all of the plurality of fuel cells than can be evaporated in prevailing temperature and pressure conditions.

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17 to 29.   (Canceled)